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Labaziewicz et al.

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(54) **DIGITAL CAMERA USING MULTIPLE LENSES AND IMAGE SENSORS TO PROVIDE AN EXTENDED ZOOM RANGE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.**

G02B 15/14 (2006.01)

G03B 41/00 (2006.01)

H04N 5/225 (2006.01)

(52) **U.S. Cl.** **359/676; 396/322; 348/207.99**

(58) **Field of Classification Search** **359/676-692, 359/72, 85, 60, 322, 435, 436; 348/240.99, 348/240.1, 239, 240.3, 262-264, 207.99, 348/34, 369, 360, 361, 344; 396/72, 85, 396/60, 322, 435, 436**

See application file for complete search history.

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Primary Examiner—Scott J. Sugarman

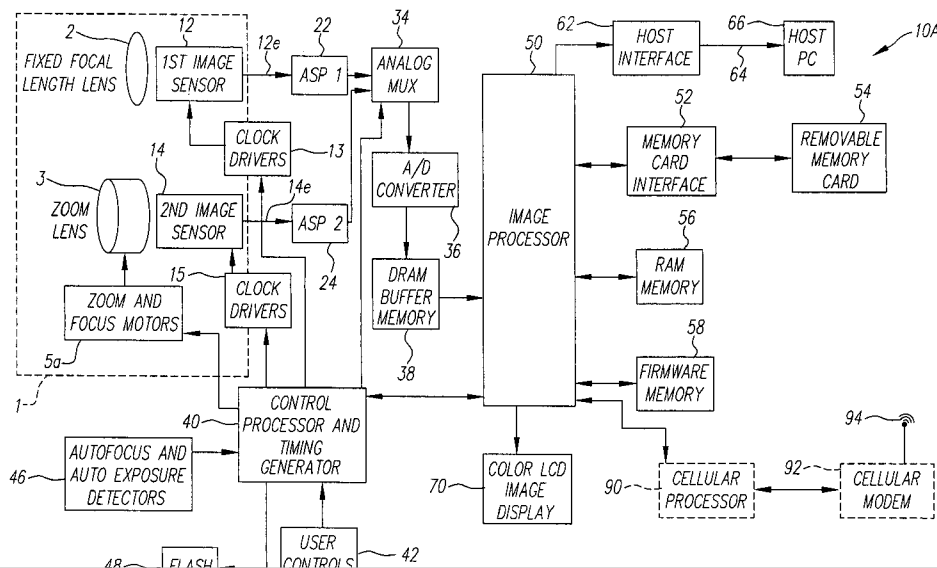
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(57) **ABSTRACT**

A digital camera includes a first image sensor, a first wide angle lens for forming a first image of a scene on the first image sensor; a second image sensor, a zoom lens for forming a second image of the same scene on the second image sensor, a control element for selecting either a first sensor output from the first image sensor or a second sensor output from the second image sensor, and a processing section for producing the output image from the selected sensor output. In one variation of this embodiment, the first lens is also a zoom lens, where the maximum focal length of the first lens is less than or equal to the minimum focal length of the second zoom lens.

55 Claims, 22 Drawing Sheets



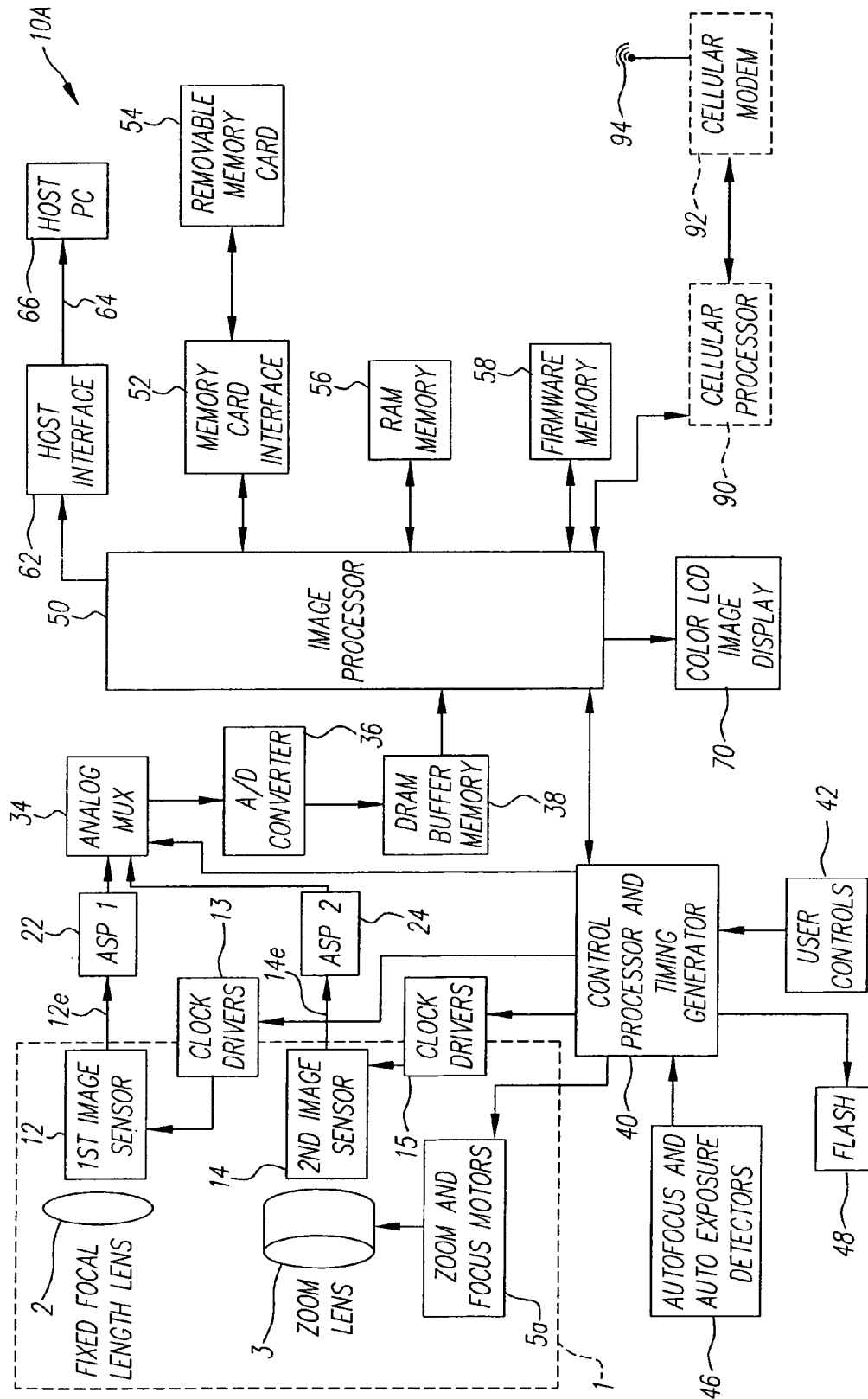


FIG. 1

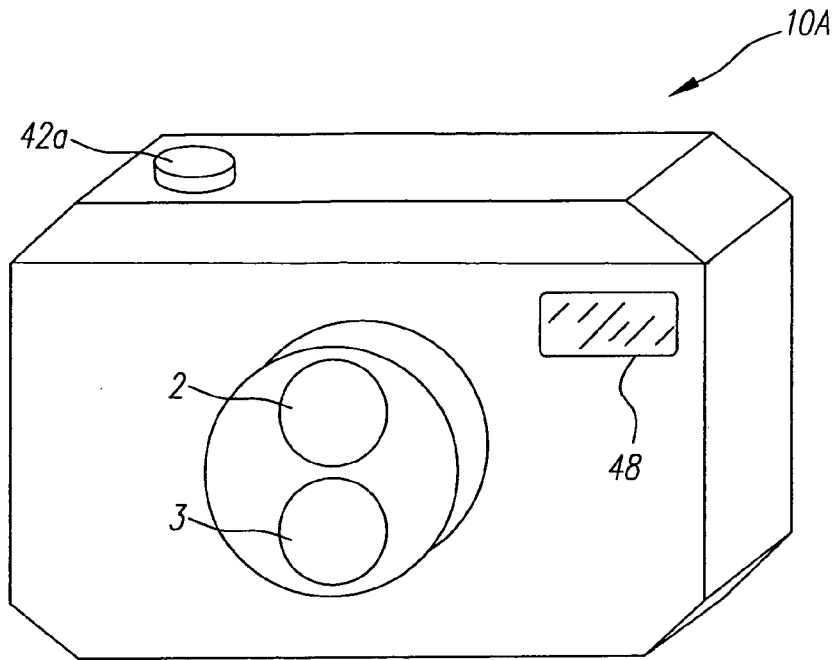


FIG. 2A

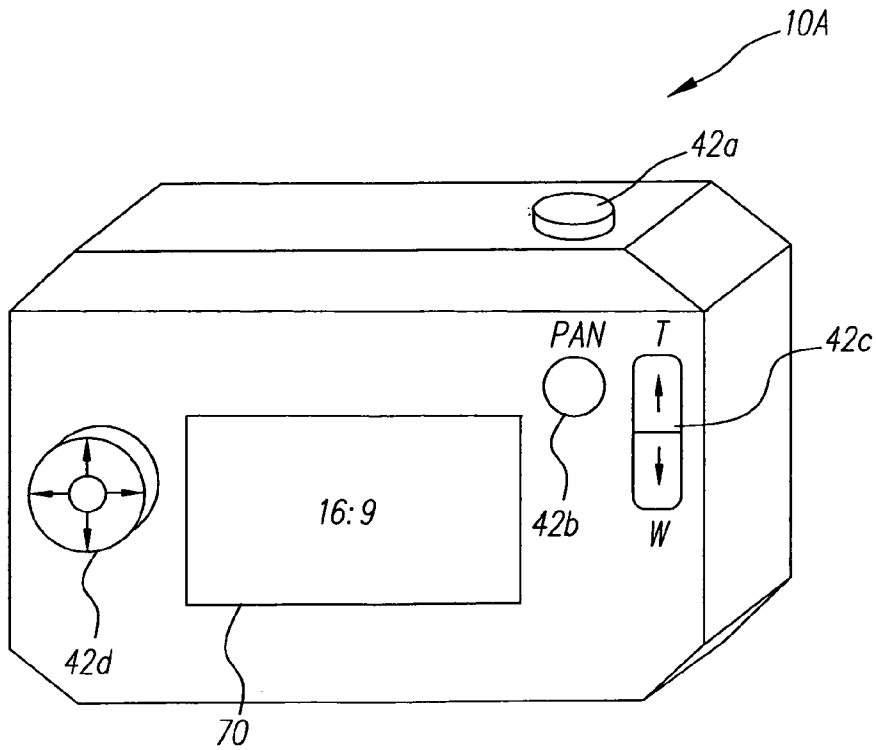


FIG. 2B

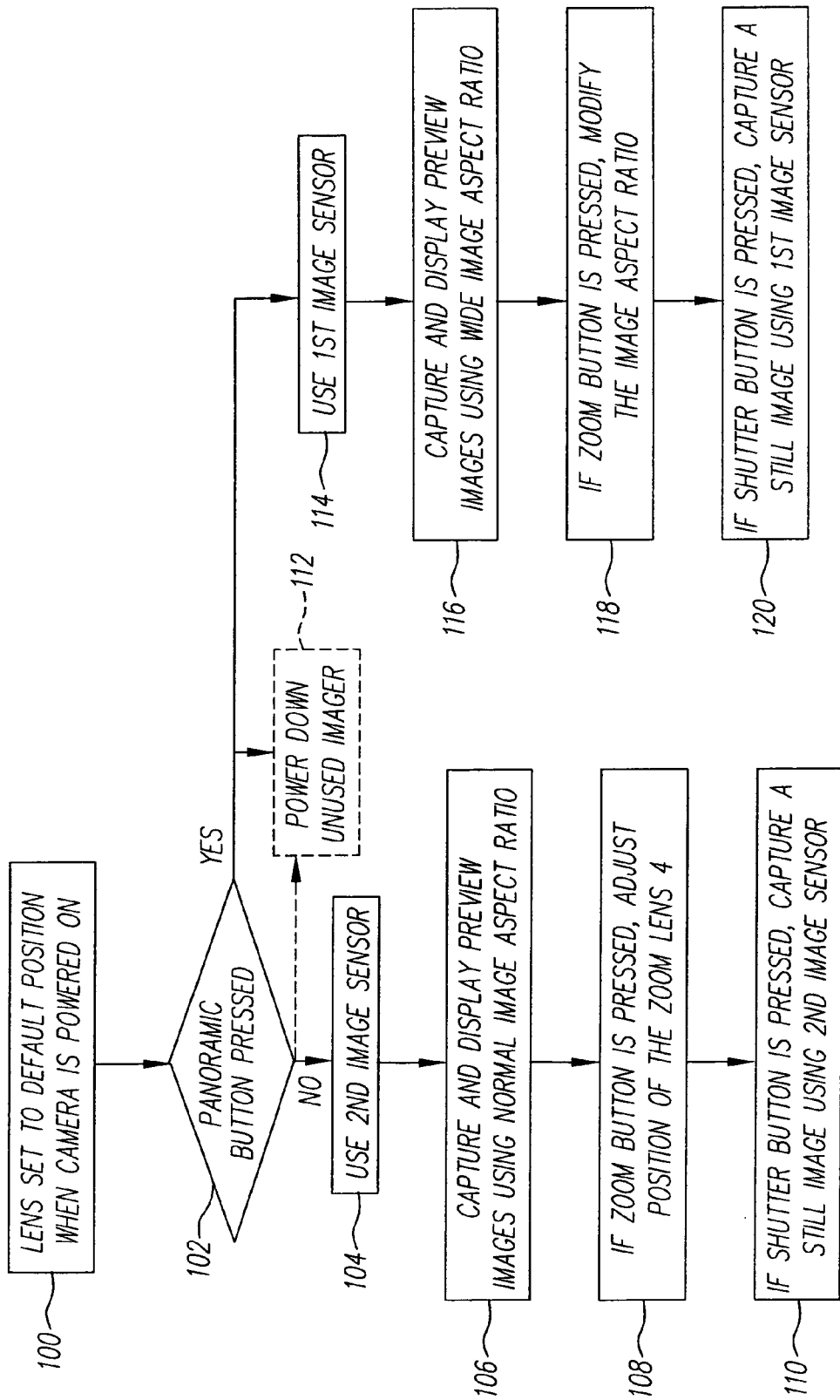


FIG. 3

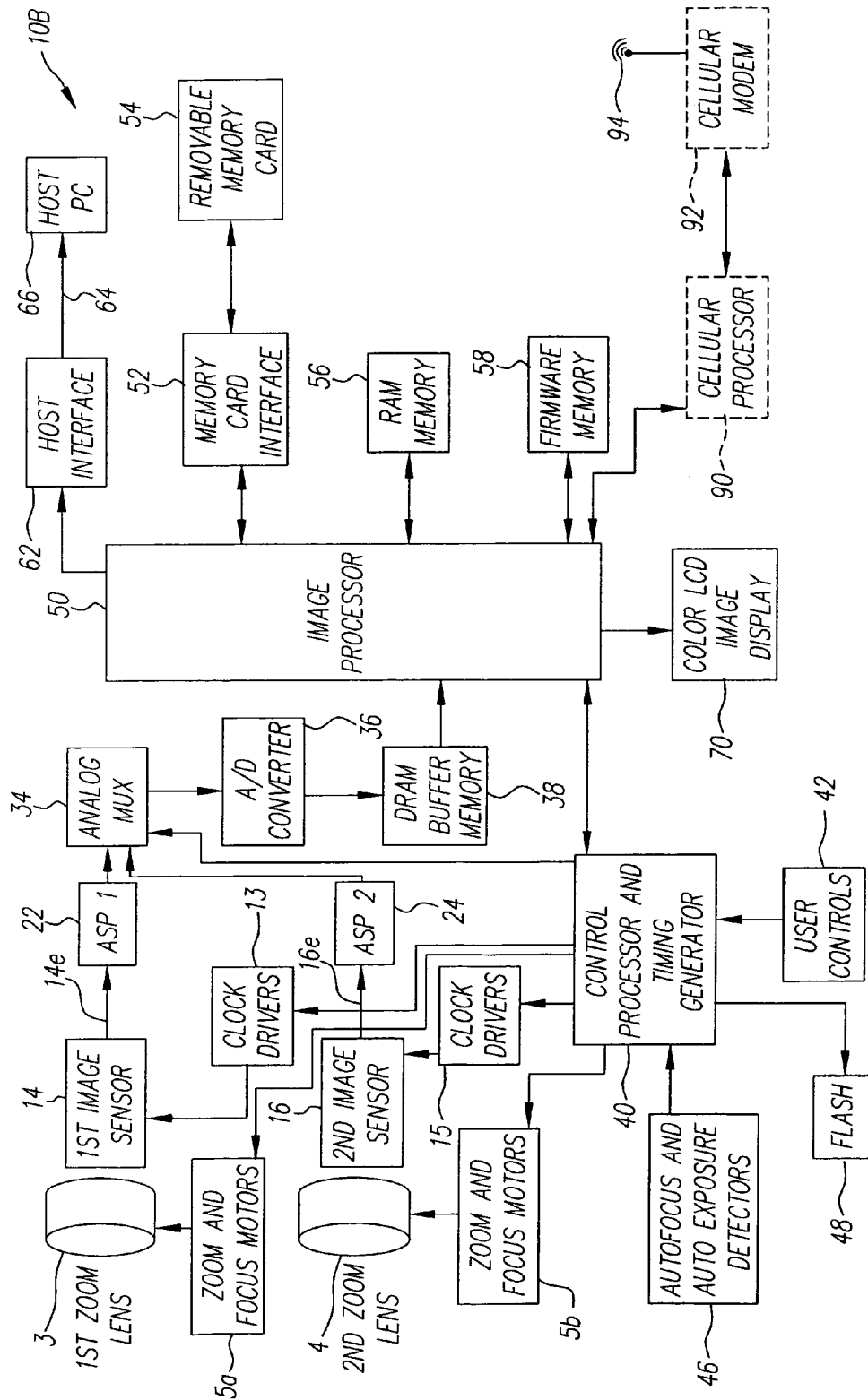


FIG. 4

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